Module 10

Safety Culture in High Reliability Organizations

October 2, 2009 **8:00 – 12:00**

NUCLEAR EXECUTIVE
LEADERSHIP TRAINING

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Safety Culture in High-Reliability Organizations

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Mr. McConnell is the Director of the Office of Safety within NNSA Defense Programs. In this role Mr. McConnell provides direct management support to senior leaders in Defense Programs for all nuclear safety and non-nuclear safety functions and issues. The scope of safety functions includes executing the NNSA self-regulatory requirements for nuclear safety and worker safety within Defense Programs.

As the Chief of Defense Nuclear Safety in the National Nuclear Security Administration (NNSA), Mr. McConnell was responsible for the development and implementation of NNSA-wide safety programs. His role was to increase corporate focus on nuclear safety and to coordinate safety issues at the NNSA site offices and headquarters. He reported directly to the NNSA administrator and advised NNSA on its interactions with the DOE, DNFSB, and other federal, state, and local agencies on matters relating to nuclear safety.

Mr. McConnell has spent a majority of his career in the oversight of nuclear safety. Spending 12 years at the DNFSB, he most recently was deputy technical director. In that position, he directed the board's technical staff and provided overall strategic planning to achieve the board's technical safety oversight mission. In this capacity, Mr. McConnell also served on the INPO Advisory Panel for Nuclear Safety Culture. During his tenure at DNFSB, he served as a group leader of the Nuclear Weapons Program, a site representative at the Pantex Plant, program manager for the Y-12 National Security Complex at Oak Ridge and a technical specialist. A former U.S. Navy officer, he served on the USS Houston and was an instructor at the SIC Nuclear Prototype Training Unit in Windsor, Connecticut.

He holds a bachelor's degree in electrical engineering from the U.S. Naval Academy and masters' degrees from the Catholic University of America and George Washington University.

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Learning Objectives

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- Compare, contrast and describe organizational culture, safety culture, and safety conscious work environment as they relate to nuclear missions in the Department of Energy.
- Given a scenario, analyze, identify, and describe potential signs of a strong or weak safety culture within the organization.
- Given the INPO Safety Culture Principles, apply those principles to organizations and missions in the Department of Energy.

Organizational Culture

- Culture is the sum total of a group's learning.
- Culture is to the organization what personality and character are to the individual.
- Organizational culture is a combination of subcultures.
  - Hourly workers, salaried personnel
  - Operators, technicians, engineers/designers
  - Union-represented workers and executives
- Why is culture important to safety?

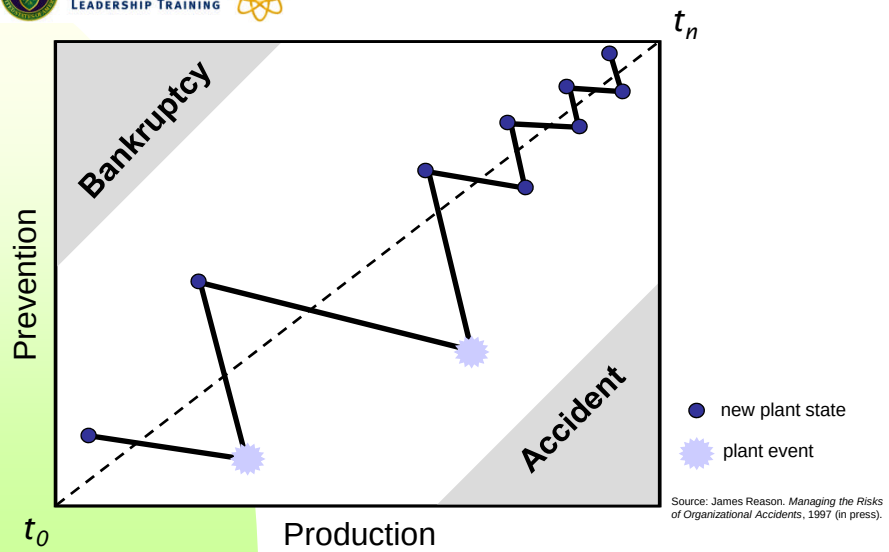
Normal Accident Theory

- Postulates that accidents in complex, tightly-coupled, high-technology organizations are inevitable.
- Normalization of Deviation
- Practical Drift
- It is easy to forget to fear things that rarely happen.

High-Reliability Organization Theory

- Characterized by placing a high cultural value on safety, effective use of redundancy, flexible and decentralized operational decision making, and a continuous learning and questioning attitude
- Elements
  - extraordinary technical competence
  - flexible decision-making processes
  - sustained high technical performance
  - processes that reward the discovery and reporting of errors
  - equal value placed on reliable production and operational safety
  - a sustaining institutional culture

Competing Resources

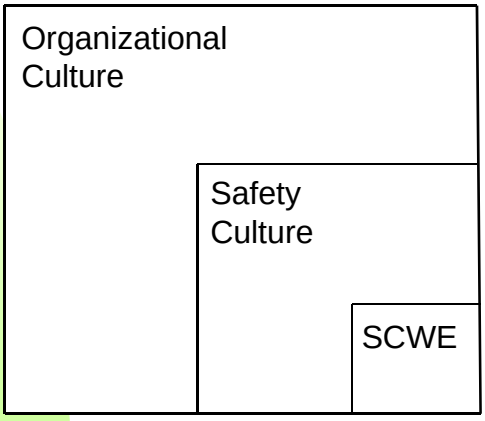


Source: James Reason. *Managing the Risks of Organizational Accidents*, 1997 (in press).

What is Safety Culture?

- **Safety Culture**: An organization's values and behaviors – modeled by its leaders and internalized by its members – that serve to make nuclear safety the overriding priority (INPO).
- Leaders affect, but do not completely define, culture or safety culture.

Conceptual Diagram



Safety Culture Continuum

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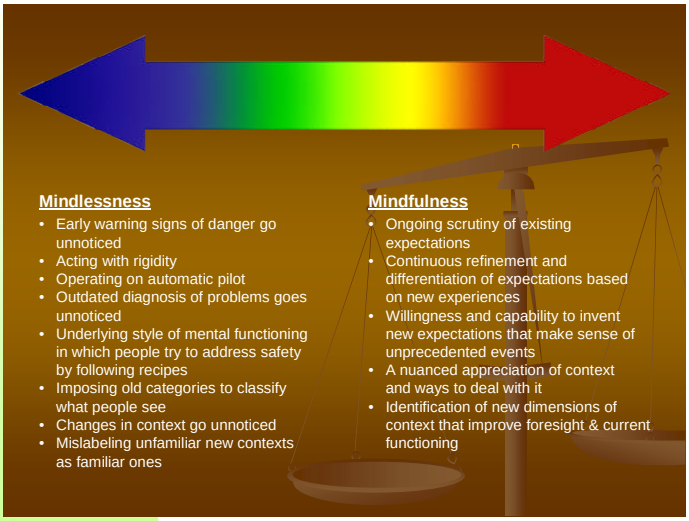

Why People Don't Behave The Way We Want Them To

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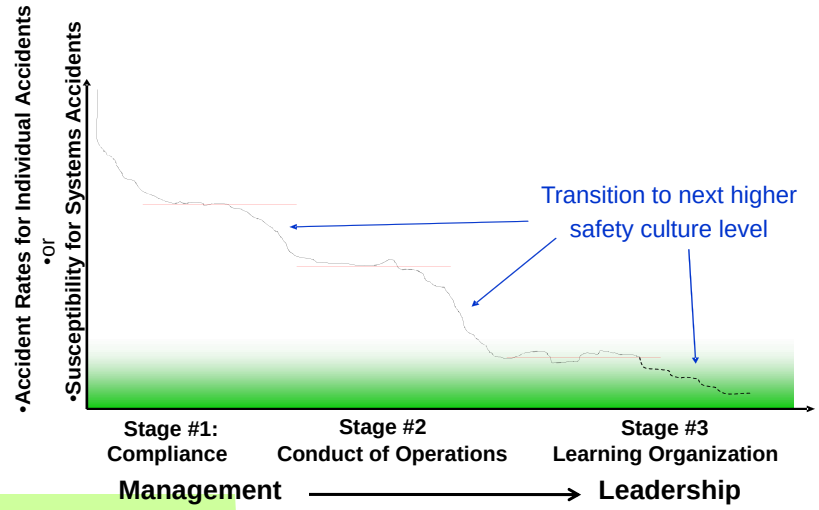
- They don't know they should. *Expectations*
- They don't know how. *Training*
- They can't. *Processes and Equipment*
- They don't want to. *Attitude*

Improvements in Safety for Each Stage of Safety Culture Maturity



HPI, BBS, VPP, and Other 3-Letter Acronym Safety Programs

- HPI, Human Performance Improvement (or Technology):
  - A structured approach to improving the performance of systems with a significant human component by analyzing important performance gaps, planning for future improvements in human performance, designing and developing effective and ethically justifiable interventions, implementing the interventions, and evaluating results

» *Adapted from ASTD Models for Human Performance Improvement, Second Edition William J. Rothwell, ed.*

- BBS, Behavior-Based Safety:
  - An observation and feedback process that helps employees identify unsafe behaviors and choose a safe behaviors
- VPP, Voluntary Protection Program:
  - VPP sets performance-based criteria for a managed safety and health system, invites sites to apply, and then assesses applicants against these criteria. Verification includes an application review and a rigorous onsite evaluation by a team of safety and health experts

INPO Safety Culture Principles

- Developed by an industry advisory group
- Describe basic principles rather than prescribing a specific program or implementing methods
- Attributes help clarify the intent of the principles

INPO Safety Culture Principles

1. Everyone is personally responsible for nuclear safety.
2. Leaders demonstrate commitment to safety.
3. Trust permeates the organization.
4. Decision-making reflects safety first.
5. Nuclear technology is recognized as special and unique.
6. A questioning attitude is cultivated.
7. Organizational learning is embraced.
8. Nuclear safety undergoes constant examination.

INPO Safety Culture Principle 1

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Everyone is personally responsible for nuclear safety.

Responsibility and authority for nuclear safety are well defined and clearly understood. Reporting relationships, positional authority, staffing, and financial resources support nuclear safety responsibilities. Corporate policies emphasize the overriding importance of nuclear safety.

1

INPO Safety Culture Principle 2

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Leaders demonstrate commitment to safety.

Executive and senior managers are the leading advocates of nuclear safety and demonstrate their commitment both in word and action. The nuclear safety message is communicated frequently and consistently, occasionally as a stand-alone theme. Leaders throughout the nuclear organization set an example for safety.

2

INPO Safety Culture Principle 3

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Trust permeates the organization.

A high level of trust is established in the organization, fostered, in part, through timely and accurate communication. There is a free flow of information in which issues are raised and addressed. Employees are informed of steps taken in response to their concerns.

3

INPO Safety Culture Principle 4

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Decision-making reflects safety first.

Personnel are systematic and rigorous in making decisions that support safe, reliable plant operation. Operators are vested with the authority and understand the expectation, when faced with unexpected or uncertain conditions, to place the plant in a safe condition. Senior leaders support and reinforce conservative decisions.

4

INPO Safety Culture Principle 5

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Nuclear technology is recognized as special and unique.

The special characteristics of nuclear technology are taken into account in all decisions and actions. Reactivity control, continuity of core cooling, and integrity of fission product barriers are valued as essential, distinguishing attributes of the nuclear station work environment.

5

INPO Safety Culture Principle 6

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A questioning attitude is cultivated.

Individuals demonstrate a questioning attitude by challenging assumptions, investigating anomalies, and considering potential adverse consequences of planned actions. This attitude is shaped by an understanding that accidents often result from a series of decisions and actions that reflect flaws in the shared assumptions, values, and beliefs of the organization. All employees are watchful for conditions or activities that can have an undesirable effect on plant safety.

6

INPO Safety Culture Principle 7

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Organizational learning is embraced.

Operating experience is highly valued, and the capacity to learn from experience is well developed. Training, self-assessments, corrective actions, and benchmarking are used to stimulate learning and improve performance.

7

INPO Safety Culture Principle 8

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Nuclear safety undergoes constant examination.

Oversight is used to strengthen safety and improve performance. Nuclear safety is kept under constant scrutiny through a variety of monitoring techniques, some of which provide an independent "fresh look."

8

CAIB Statement

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"Cultural traits and organizational practices detrimental to safety and reliability were allowed to develop, including:

- reliance on past success as a substitute for sound engineering practices
- organizational barriers which prevented effective communication of critical safety information and stifled professional differences of opinion;
- lack of integrated management across program elements; and
- the evolution of an informal chain of command and decision-making processes that operated outside the organization's rules...."

Lessons Learned from the Space Shuttle Columbia Accident

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- Well-intentioned people and high-risk organizations can become desensitized to deviations from standards.
- Past successes may be the first step toward future failure.
- Organizations, like people, must always be learning, especially from past mistakes.
- Poor organizational structure can be just as dangerous to a system as technical, logistical, or operational factors.
- Leadership training and system safety training are wise investments in an organization's current and future health.

Lessons Learned from the Space Shuttle Columbia Accident (cont.)

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- Leaders must ensure external influences do not result in unsound program decisions.
- Leaders must demand minority opinions and healthy pessimism.
- Stick to the basics.
- High-reliability organization safety programs cannot remain silent or on the sidelines – must be visible, critical, empowered, and fully engaged.
- Safety efforts must focus on preventing versus solving mishaps.

Issues Identified from Davis-Besse Incident

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- Strained engineering resources
- An approach of addressing the symptoms of problems as a means of minimizing production impacts
- A long-standing acceptance of degraded equipment
- A lack of management involvement in important safety-significant work activities and decisions, including a lack of a questioning attitude by managers
- A lack of engineering rigor in the approach to problem resolution

Issues Identified from Davis-Besse Incident (cont.)

- Lack of awareness of internal and external operating experience, including the inability to implement effective actions to address the lessons learned from past events
- Ineffective and untimely corrective actions, including the inability to recognize or address repetitive or recurring problems
- Ineffective self-assessments of safety performance
- Weaknesses in the implementation of the employee concerns program
- Lack of compliance with procedures

Safety Culture Break-Out Session

Identify 3 – 5 specific indicators that would indicate a potential weak safety culture and describe how they would specifically address the issues within the DOE environment. (You have 45 minutes.)

Each break-out group will return and brief their results to the full group.